

ABSTRACT OF THE INVENTION

The present invention is level set system for implementing interactive editing operators for surfaces. Level set models are deformable implicit surfaces where the deformation of the surface (editing operation) is controlled by a speed function in the level set partial differential equation. The level set system overcomes the self-interaction problems associated with mesh models. One embodiment takes scan converts input models such as polygon mesh, NURBS, CSGS models into level set models. An interface is provided by which models can be edited with editing operators such as blending, smoothing, embossing, etc. One embodiment utilizes several methods to optimize computations related to the editing operators. For example, shortest distance calculations, bounding boxes, numerical integration, and the sparse-field methods are disclosed for the implementation of the level set deformation operator embodiments including blending, smoothing sharpening, and embossing. The resulting level sets model can be volume rendered or extracted to a polygon mesh.